PATENT
Docket No.: PIPE-001

AMENDMENT TO THE CLAIMS

1. (Currently Amended) A method for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles θ_n comprising:

generating the waveform having an amplitude Y defined by a first function at phase angles lying outside of data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~, said first function being $Y=sin\theta$;

generating the waveform having an amplitude Y defined by said first function at phase angles lying inside said data regions having a range of $\Delta\theta$ beginning at each phase angle θ_n where data of the first value is to be encoded; and

generating the waveform having an amplitude Y defined by a second function at phase angles lying inside said data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, said second function being different from $Y=sin\theta$.

2. (Original) The method of claim 1 wherein the number of selected phase angles θ_n is variable.

3. (Original) The method of claim 1 wherein the number of selected phase angles θ_n is dynamically variable during a communication in response to feedback from an apparatus receiving said waveform.

4. (Original) The method of claim 1 wherein the number of selected phase angles θ_n is dynamically variable during a communication in response to negotiation with an apparatus receiving said waveform.

5. (Original) The method of claim 1 wherein the value of each of said selected phase angles θ_n is variable.

6. (Original) The method of claim 1 wherein the value of at least one of said selected phase angles θ_n is altered for an interval of time to identify an event.

7. (Original) The method of claim 1 wherein the value of at least one of said selected phase angles θ_n is altered for an interval of time to encode an additional data bit.

8. (Currently Amended) A method for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles θ_n comprising:

generating the waveform having an amplitude Y defined by a first function at phase angles lying outside of data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~, said first function being $Y=sin\theta$;

generating the waveform having an amplitude Y defined by said first function at phase angles lying inside said data regions having a range of $\Delta\theta$ beginning at each phase angle θ_n where data of the first value is to be encoded; and

generating the waveform having an amplitude Y defined by a second function at phase angles lying inside said data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, said second function being one of $Y=sin\theta_n$ and $Y=sin\theta_{(n+\Delta\theta)}$.

9. (Original) The method of claim 8 wherein the number of selected phase angles θ_n is variable.

10. (Original) The method of claim 8 wherein the number of selected phase angles θ_n is dynamically variable during a communication in response to feedback from an apparatus receiving said waveform.

11. (Original) The method of claim 8 wherein the number of selected phase angles θ_n is dynamically variable during a communication in response to negotiation with an apparatus receiving said waveform.

12. (Original) The method of claim 8 wherein the value of at least one of said selected phase angles θ_n is variable.

13. (Original) The method of claim 8 wherein the value of at least one of said selected phase angles θ_n is altered for an interval of time to identify an event.

14. (Original) The method of claim 8 wherein the value of at least one of said selected phase angles θ_n is altered for an interval of time to encode an additional data bit.

15. (Currently Amended) A method for generating a plurality of substantially sinusoidal waveforms each having a different frequency and containing encoded digital data having one of a first value and a second value at selected phase angles θ_n comprising:

generating each waveform having an amplitude Y defined by a first function at phase angles lying outside of data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~, said first function being $Y=sin\theta$;

generating each waveform having an amplitude Y defined by said first function at phase angles lying inside said data regions having a range of $\Delta\theta$ beginning at each phase angle θ_n where data of the first value is to be encoded; and

generating each waveform having an amplitude Y defined by a second function at phase angles lying inside said data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, said second function being different from $Y=sin\theta$.

16. (Original) The method of claim 15 wherein the number of selected phase angles θ_n for each waveform is variable.

17. (Original) The method of claim 15 wherein the number of selected phase angles θ_n for each waveform is dynamically variable during a communication in response to feedback from an apparatus receiving said each waveform.

18. (Original) The method of claim 15 wherein the number of selected phase angles θ_n for each waveform is dynamically variable during a communication in response to negotiation with an apparatus receiving said each waveform.

19. (Original) The method of claim 15 wherein the value of at least one of said selected phase angles θ_n in at least one of said waveforms is altered for an interval of time to identify an event.

20. (Original) The method of claim 15 wherein the value of at least one of said selected phase angles θ_n in at least one of said waveforms is altered for an interval of time to encode an additional data bit.

21. (Currently Amended) A method for generating a plurality of substantially sinusoidal waveforms each having a different frequency and containing encoded digital data having one of a first value and a second value at selected phase angles θ_n comprising:

generating each waveform having an amplitude Y defined by a first function at phase angles lying outside of data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~, said first function being $Y=sin\theta$;

generating each waveform having an amplitude Y defined by said first function at phase angles lying inside said data regions having a range of $\Delta\theta$ beginning at each phase angle θ_n where data of the first value is to be encoded; and

generating each waveform having an amplitude Y defined by a second function at phase angles lying inside said data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, said second function being one of $Y=sin\theta_n$ and $Y=sin\theta_{(n+\Delta\psi)}$.

22. (Original) The method of claim 21 wherein the number of selected phase angles θ_n for each waveform is variable.

23. (Original) The method of claim 21 wherein the number of selected phase angles θ_n for each waveform is dynamically variable during a communication in response to feedback from an apparatus receiving said each waveform.

24. (Original) The method of claim 21 wherein the number of selected phase angles θ_n for each waveform is dynamically variable during a communication in response to negotiation with an apparatus receiving said each waveform.

25. (Original) The method of claim 21 wherein the value of at least one of said selected phase angles θ_n in at least one of said waveforms is altered for an interval of time to identify an event.

26. (Original) The method of claim 21 wherein the value of at least one of said selected phase angles θ_n in at least one of said waveforms is altered for an interval of time to encode an additional data bit.

27. (Currently Amended) A method for decoding information from a substantially sinusoidal waveform containing encoded digital data at selected phase angles θ_n, the waveform having an amplitude $Y=sin\theta$ at phase angles lying

outside of regions having a range of $\Delta\theta$ beginning at each phase angle θ_n, the waveform having an amplitude $Y=sin\theta$ at phase angles lying inside the data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~ where data of the first value is to be encoded, the waveform having an amplitude Y defined by a different from $Y=sin\theta$ at phase angles lying inside the data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, comprising:

receiving the sinusoidal waveform containing encoded digital data;

generating a reference sinusoidal waveform from said substantially sinusoidal waveform containing encoded digital data, said reference sinusoidal waveform having a constant phase relationship with said sinusoidal waveform containing encoded digital data;

mixing said reference sinusoidal waveform and said substantially sinusoidal waveform containing encoded digital data in a balanced mixer; and

extracting said encoded digital data from said balanced mixer.

Claims 28-66 (Canceled)

67. (Currently Amended) Apparatus for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles θ_n comprising:

means for generating the waveform having an amplitude Y defined by a first function at phase angles lying outside of data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~, said first function being $Y=sin\theta$;

means for generating the waveform having an amplitude Y defined by said first function at phase angles lying inside said data regions having a range of $\Delta\theta$ beginning at each phase angle θ_n where data of the first value is to be encoded; and

means for generating the waveform having an amplitude Y defined by a second function at phase angles lying inside said data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, said second function being different from $Y=sin\theta$.

68. (Original) The apparatus of claim 67 further including means for changing the number of selected phase angles θ_n.

69. (Original) The apparatus of claim 67 further including means for dynamically varying the number of selected phase angles θ_n during a communication in response to feedback from an apparatus receiving said waveform.

70. (Original) The apparatus of claim 67 further including means for dynamically varying the number of selected phase angles θ_n during a communication in response to negotiation with an apparatus receiving said waveform.

71. (Original) The apparatus of claim 67 further including means for varying the value of each of said selected phase angles θ_n.

72. (Original) The apparatus of claim 67 further including means for altering the value of at least one of said selected phase angles θ_n for an interval of time to identify an event.

73. (Original) The apparatus of claim 67 further including means for altering the value of at least one of said selected phase angles θ_n for an interval of time to encode an additional data bit.

74. (Currently Amended) Apparatus for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles θ_n comprising:

means for generating the waveform having an amplitude Y defined by a first function at phase angles lying outside of data regions ~~having a range of $\Delta\theta$ beginning at each phase angle θ_n~~, said first function being $Y=sin\theta$;

means for generating the waveform having an amplitude Y defined by said first function at phase angles lying inside said data regions having a range of $\Delta\theta$ beginning at each phase angle θ_n where data of the first value is to be encoded; and

means for generating the waveform having an amplitude Y defined by a second function at phase angles lying inside said data regions having a range of $\Delta\theta$ associated with each phase angle θ_n where data of the second value is to be encoded, said second function being one of $Y=sin\theta_n$ and $Y=sin\theta_{(n+\Delta\theta)}$.

75. (Original) The apparatus of claim 74 further including means for changing the number of selected phase angles θ_n.

76. (Original) The apparatus of claim 74 further including means for dynamically varying the number of selected phase angles θ_n during a communication in response to feedback from an apparatus receiving said waveform.

77. (Original) The apparatus of claim 74 further including means for dynamically varying the number of selected phase angles θ_n during a communication in response to negotiation with an apparatus receiving said waveform.

78. (Original) The apparatus of claim 74 further including means for varying the value of each of said selected phase angles θ_n.

79. (Original) The apparatus of claim 74 further including means for altering the value of at least one of said selected phase angles θ_n for an interval of time to identify an event.

80. (Original) The apparatus of claim 74 further including means for altering the value of at least one of said selected phase angles θ_n for an interval of time to encode an additional data bit.